

Green Stimulus Overview

F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

STRICTLY CONFIDENTIAL

Agenda

- Introductions
- Current status of the impact of Covid-19 on traffic and industry
- Aircraft fleet renewal overview
- New aircraft development overview
- Fleet Renewal and New Aircraft Development in perspective - EU Destination 2050 Roadmap
- Reminder of the Green Stimulus Scheme
  - Green Stimulus economic impact when replacing old aircraft
  - The Environmental benefits of the Green Stimulus
- Conclusions
- Q&A



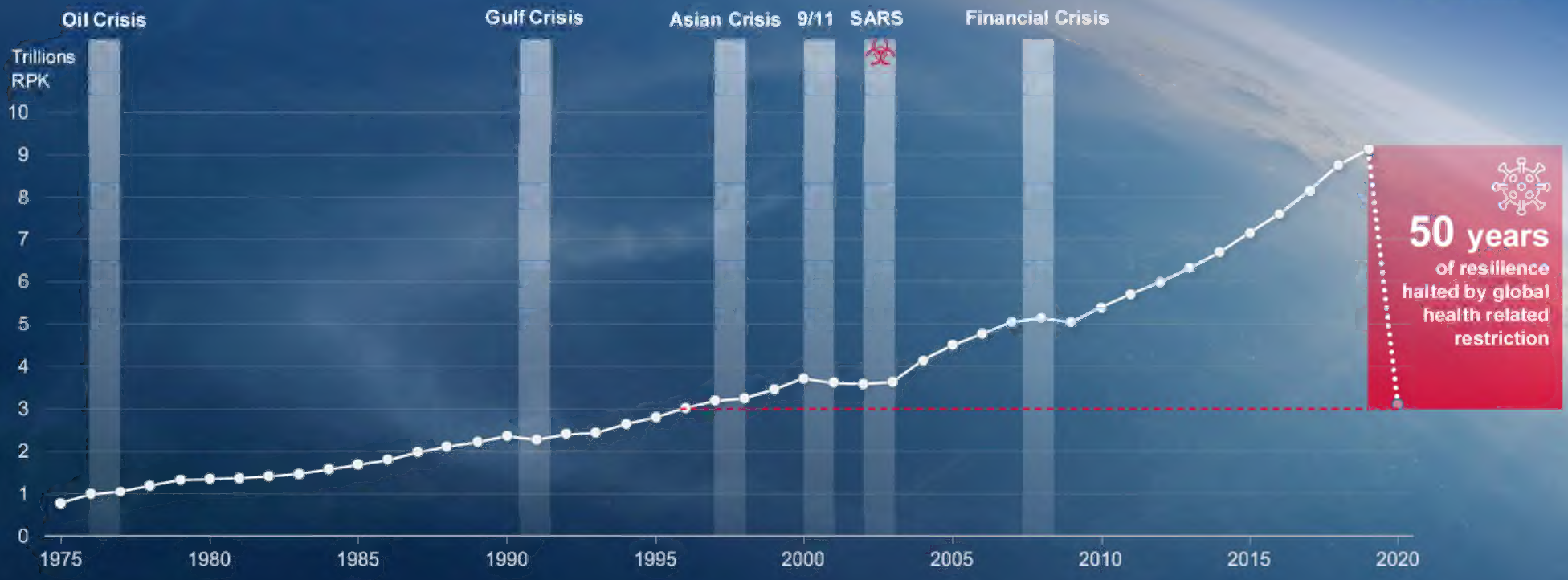
Current status of the impact of Covid-19 on traffic and industry

F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

2020: traffic back to its ~25 years ago level

RPK = Revenue Passenger Kilometre
Source: ICAO, Airbus GMF 2019
IATA sept 2020 forecast



AIRBUS

2020 results dramatically impacted by COVID-19 crisis

Unprecedented mobility and border restrictions shape record-low numbers



Source: Airbus estimation based on latest publication of ICAO, IATA, IHS Markit

AIRBUS

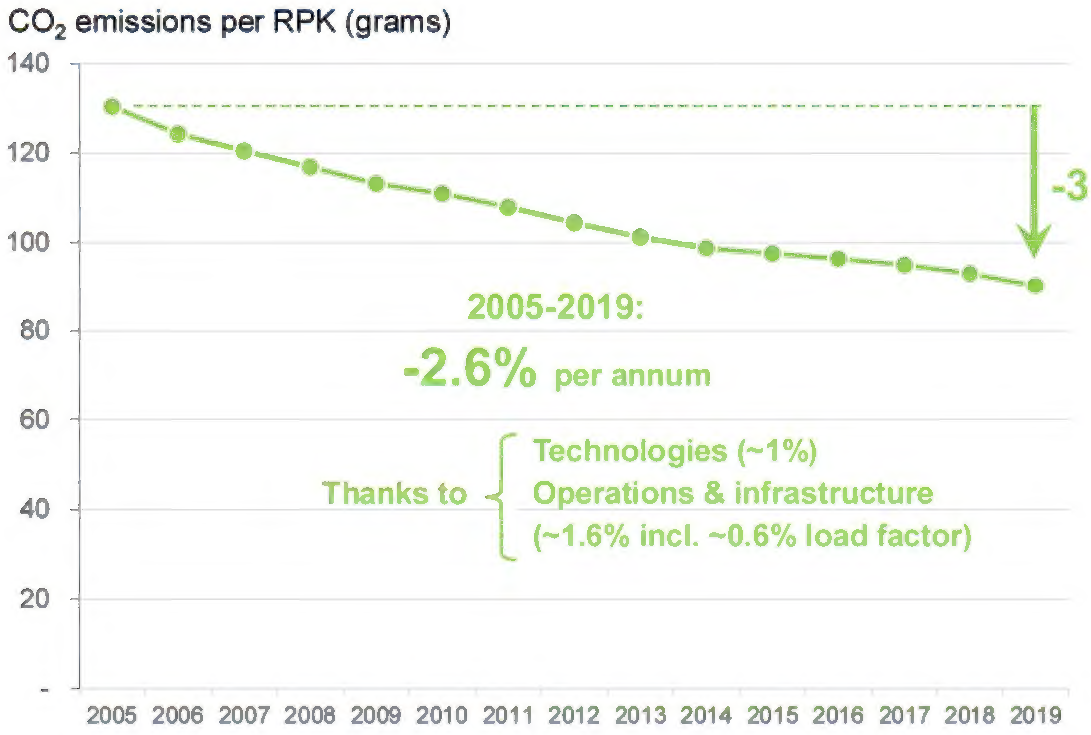


Aircraft Fleet Renewal Overview

F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

Impressive 2005-2019 global efficiency improvements, beyond industry commitment

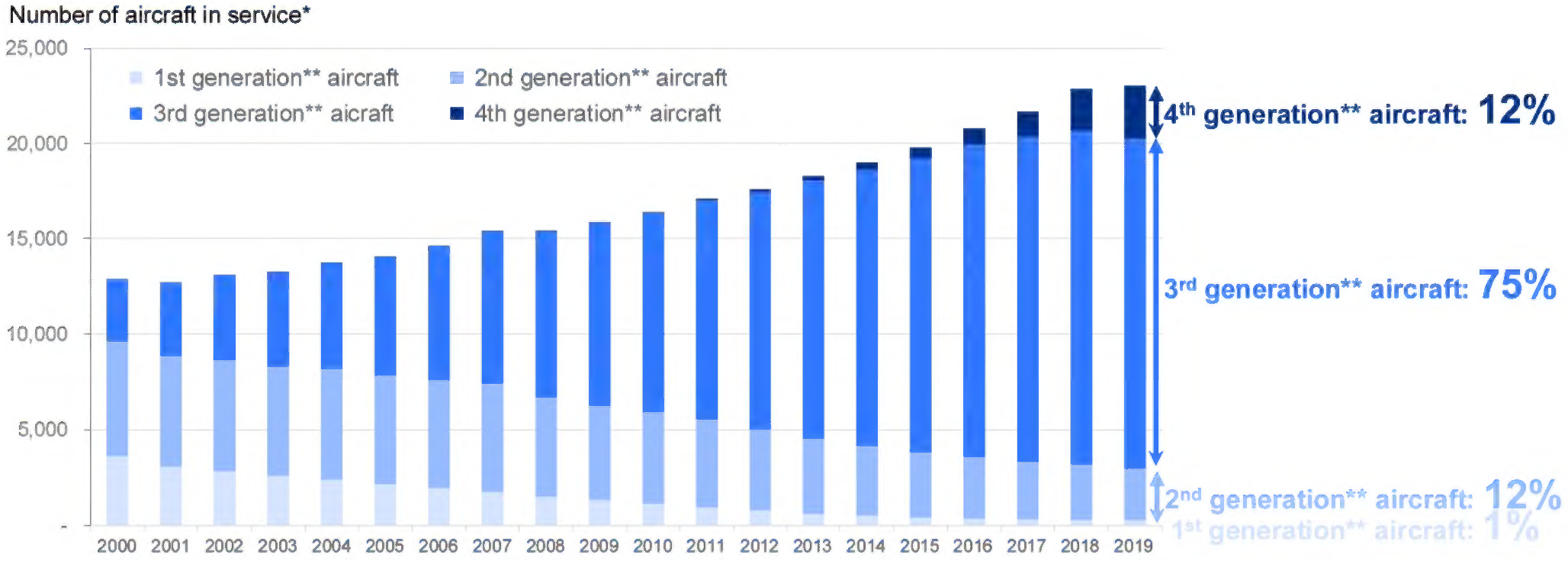


From 2005 to 2019, the Air Transport Industry has far exceeded its 1.5% yearly improvement commitment with 2.6% yearly achievement (equivalent to a cumulated -31% overall improvement during the period).

Source: ICAO, IATA, Airbus, CAGR = Compound Annual Growth Rate
Scope: Commercial aircraft operations

AIRBUS

Only 12% of the world fleet in service at end 2019 were latest 4th generation aircraft



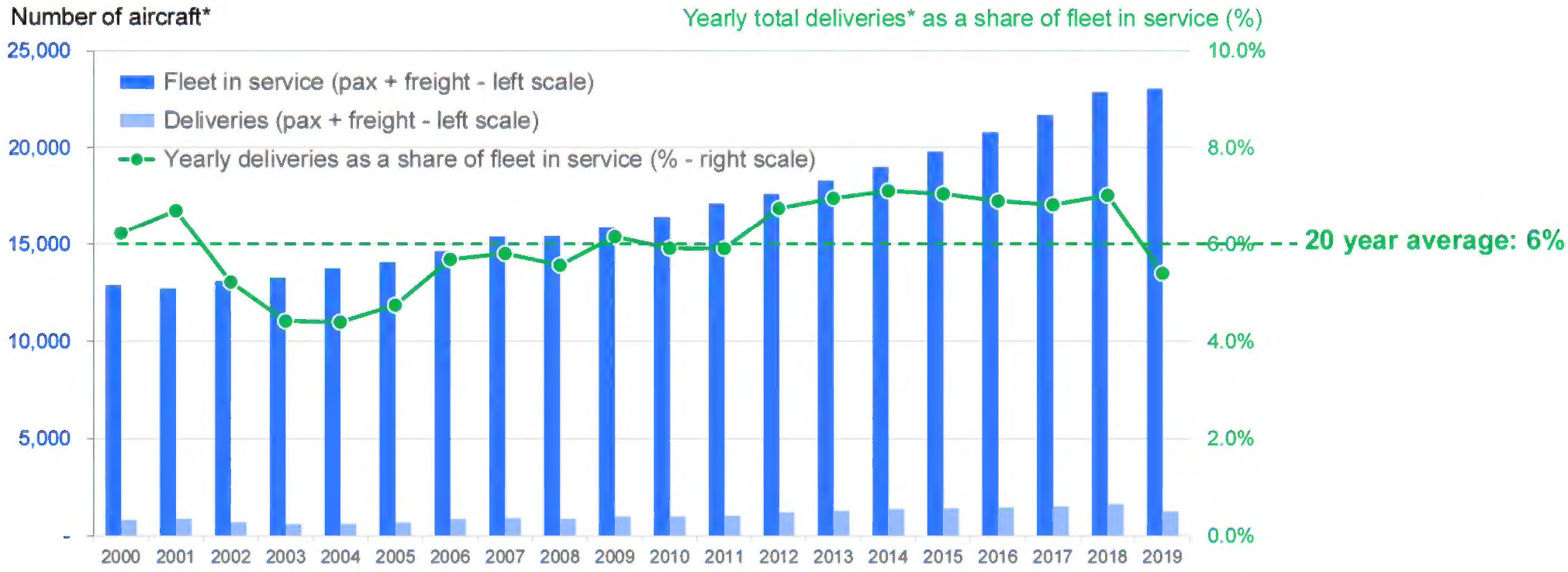
* Western built passenger aircraft above 100 seats & western built freighter aircraft above 10 tonnes

** 1st generation: A300, DC 9, DC10, 707, 727, 737, 747
3rd generation: A320 Fam., A330, A340, 717,737NG, 747,777
2nd generation: A310, MD11, MD80, MD90,737, 747, 757, 767, F100
4th generation: A220, A320neo Fam., A330neo, A350, A380, 737Max, 777X, 787

Source: Cirium, Airbus

AIRBUS

Over the last 20 years, yearly deliveries has averaged 6% of the fleet in service



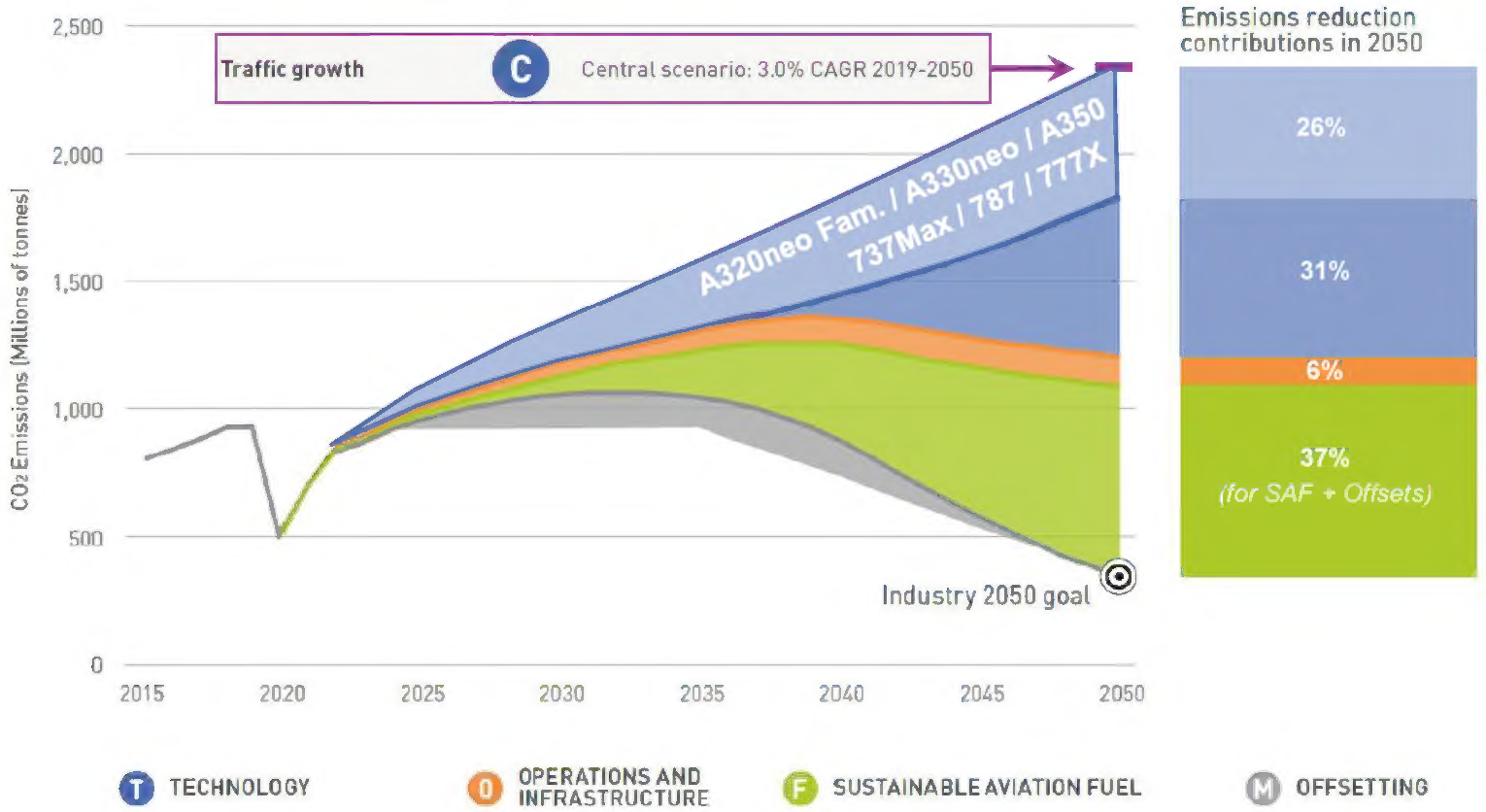
* Western built passenger aircraft above 100 seats & western built freighter aircraft above 10 tonnes

Source: Cirium, Airbus

AIRBUS

CO2 emissions with technology scenario with visual global fleet replacement

T5 Aspirational technology



Source: ATAG Waypoint 2050, Airbus

AIRBUS

Aircraft Fleet Renewal Summary

- The latest generation of aircraft (4th generation), such as the A320NEO's and A350's, only represent 12% of the current global fleet. Hence there is a significant opportunity to replace the current fleet with 20-30% more efficient aircraft
- With an estimated 30,000 commercial aircraft forecast in the global fleet by 2035, the impact of fleet renewal on emissions is crucial. By replacing aircraft earlier, this airline could synchronise their next aircraft acquisition in line with the next wave of new generation aircraft in 2035
- Due to the Covid crisis, aircraft lease returns are currently decreasing, which in turn could encourage airlines to continue operating older aircraft in the coming years
- Drop-in Sustainable Aviation Fuel (SAF) will play a very important role in decarbonising the current 4th generation aircraft in service. These aircraft are already certified to fly with a 50% blend of SAF and the industry is looking to increase this to 100% in the future.
- Finnish studies estimate that 85% of the EU aviation fuel supply in 2050 will be through Sustainable Aviation Fuels
- Additionally, there is a very close synergy between drop-in synthetic fuels and zero emission hydrogen aircraft, as the synthetic fuel will be an important catalyst to allow aviation to ramp-up its hydrogen supply and infrastructure.
- **The EU's Taxonomy is an essential tool to establish robust criteria for defining a sustainable activity in aviation, to avoid subjective financial decision making**

AIRBUS



New Aircraft Development Overview

F Timmermans Cabinet Briefing 9th February 2021

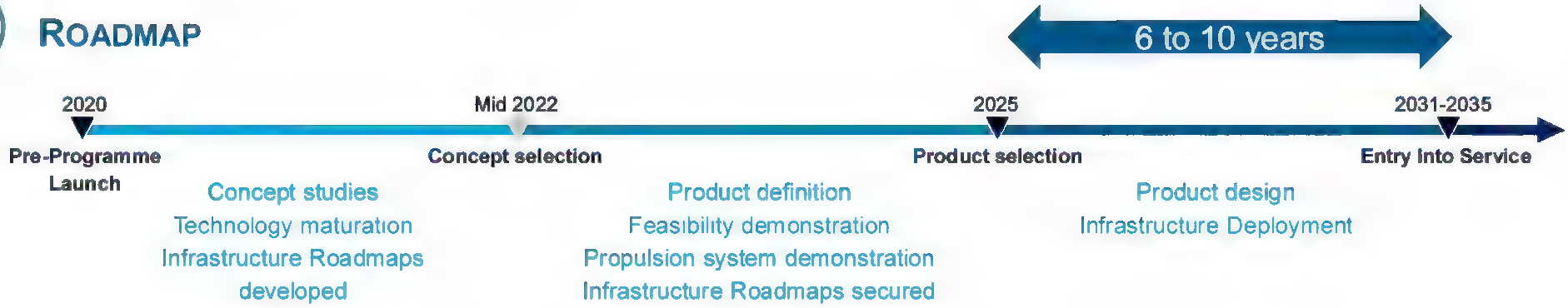
AIRBUS

Our technology roadmap

AIRBUS AMBITION

- Bring zero carbon emission commercial aircraft to market by 2035.
- ZEROe concepts were announced on 21 September

ROADMAP



Very aggressive roadmap to bring zero-emission to market by 2035

AIRBUS

Bringing together elements. Source : ATAG

Indicative overview of where CO_2 measures could be deployed globally

	2020	2025	2030	2035	2040	2045	2050	
Commuter » 9-50 seats » <60 minute flights » <1% of industry CO_2	SAF	Electric and/or SAF	Electric and/or SAF	Electric and/or SAF	Electric and/or SAF	Electric and/or SAF	Electric and/or SAF	~27% of CO_2 emissions
Regional » 50-100 seats » 30-90 minute flights » ~3% of industry CO_2	SAF	SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	
Short-haul » 100-150 seats » 45-120 minute flights » ~24% of industry CO_2	SAF	SAF	SAF	SAF	Electric, hydrogen combustion and/or SAF	Electric, hydrogen combustion and/or SAF	Electric, hydrogen combustion and/or SAF	
Medium-haul » 100-250 seats » 60-150 minute flights » ~43% of industry CO_2	SAF	SAF	SAF	SAF	SAF	SAF	SAF potentially some Hydrogen	~73% of CO_2
Long-haul » 250+ seats » 150 minute + flights » ~30% of industry CO_2	SAF	SAF	SAF	SAF	SAF	SAF	SAF	

New Aircraft Development / ZEROe Summary

- New aircraft development programmes typically have a 10 year development timescale from product selection to Entry into service (EIS)
- The decision to proceed will not only be on the product itself, but also whether sufficient quantities of green energy (ie Hydrogen) will be available, the required infrastructure will be in place at airports and a global level playing field in terms of regulation.
- Zero emission hydrogen aircraft will be primarily focused on regional and shorter range aircraft from 2035, which means that current and future iterations of highly efficient gas turbines will still be required as we move towards 2050, especially for long haul operations.
- The rate of production ramp-up will be an another important factor in determining the penetration rate of these new developments and resulting CO2 emissions, which due to the size of the flying fleet, will take time

AIRBUS



Fleet Renewal and New Aircraft Development in perspective

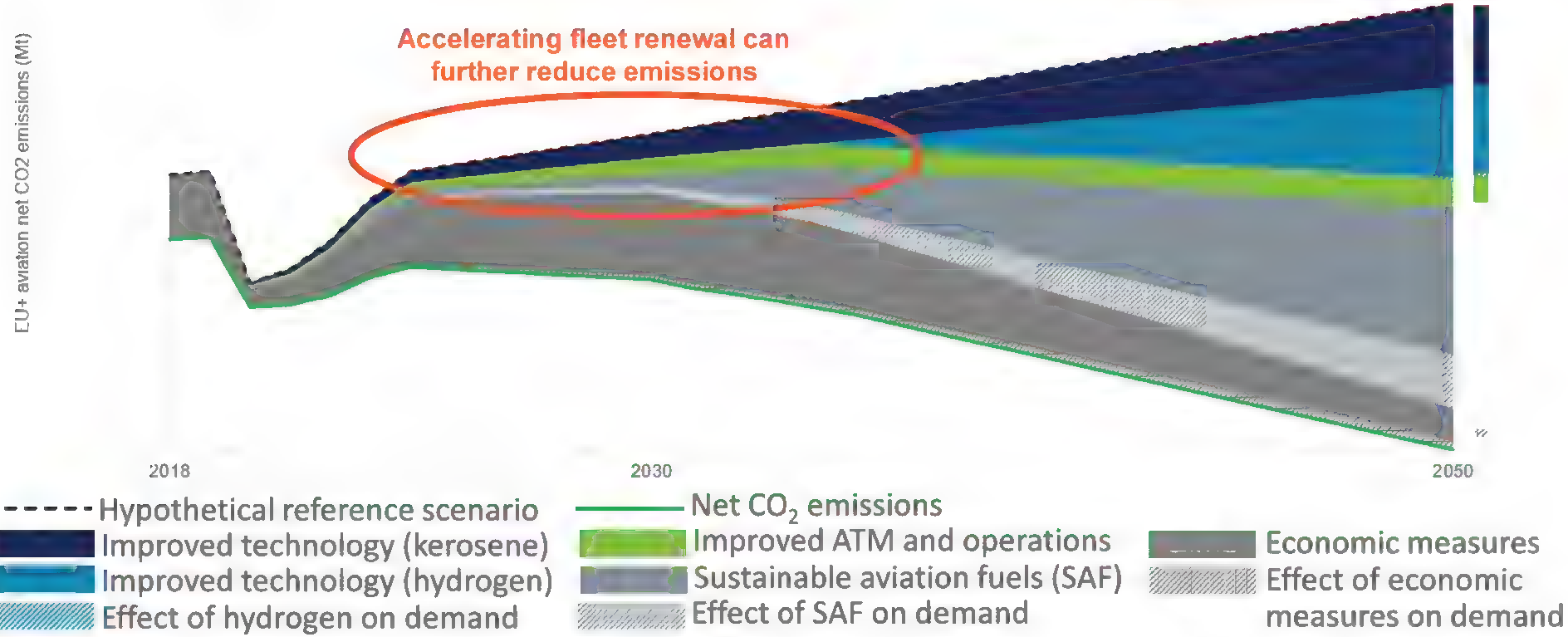
F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

Decarbonisation Roadmap for European Aviation

All flights in scope

Draft and Confidential
Release 11th February



The Destination 2050 report demonstrates the importance of fleet renewal of both conventional and hydrogen aircraft

AIRBUS



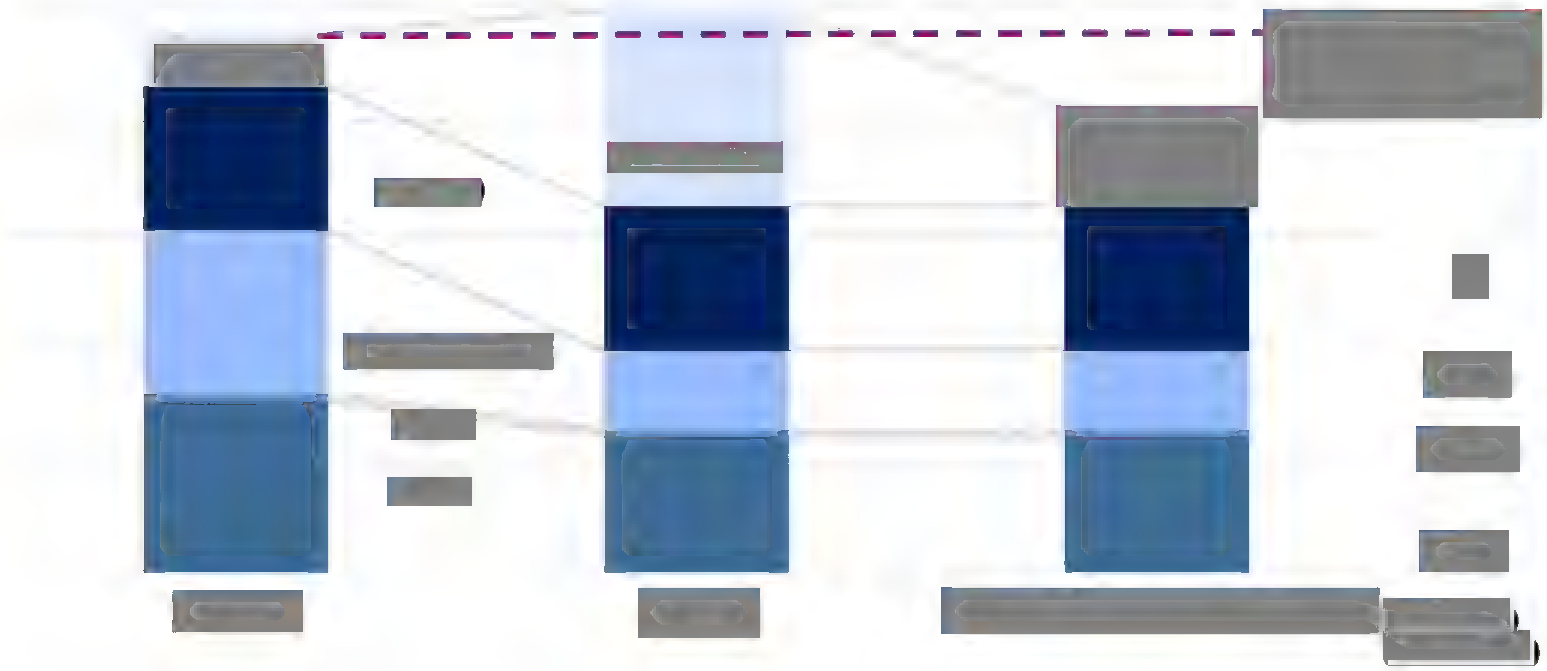
Green Stimulus economic impact when replacing old aircraft in Europe

F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

AIRBUS CONFIDENTIAL

Old A320-200 vs new A320neo over 4 years

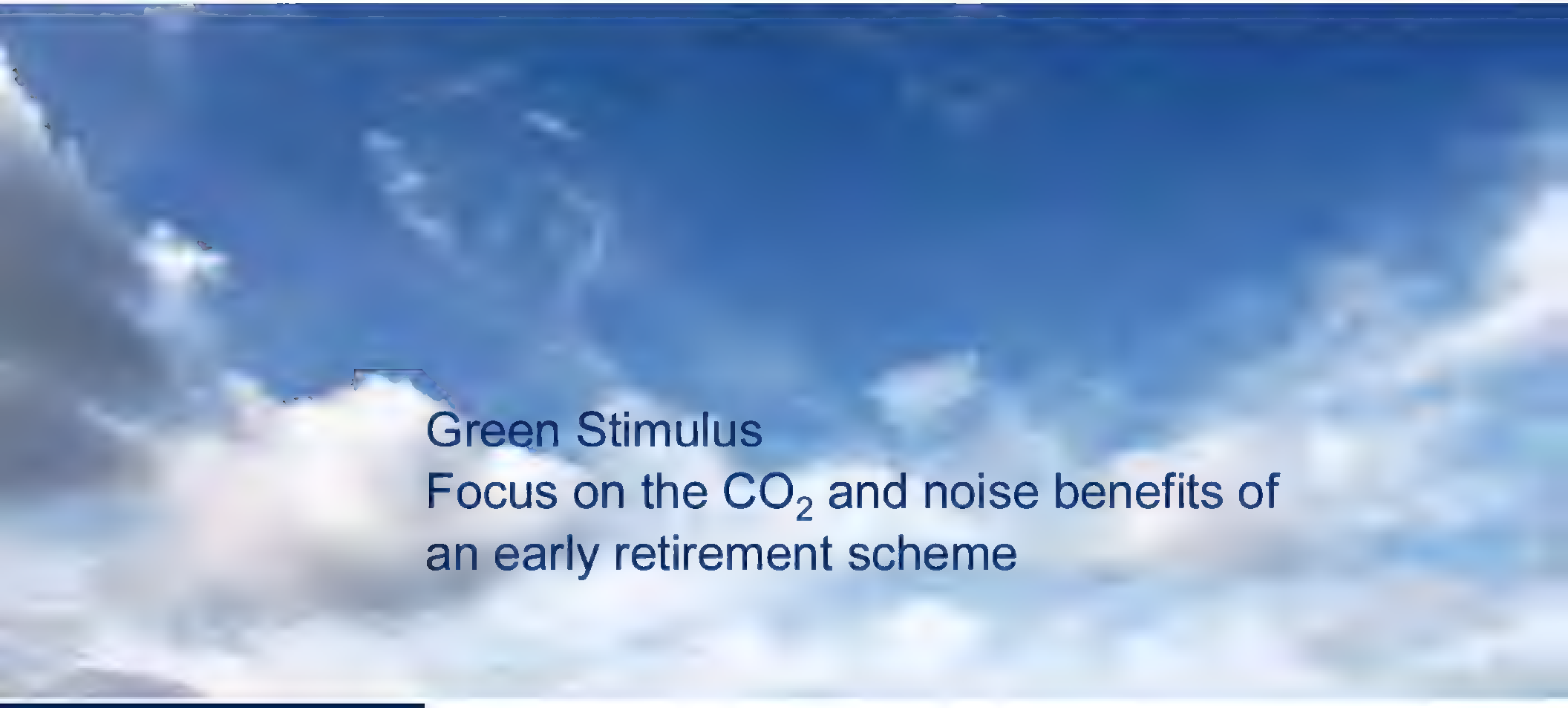


Green Stimulus impact

The Green Stimulus makes the business case work

Fuel price: 1.5US$/gallon
CO2 cost: 35€/t of CO2 - based on 2019 cost and considering 85% free allowances and 15% auctioning
Period comparison: 4 years
Sector length: 800nm
Annual utilization: 1585 trips per year

AIRBUS



Green Stimulus
Focus on the CO_2 and noise benefits of an early retirement scheme

F Timmermans Cabinet Briefing 9th February 2021

AIRBUS

Fleet renewal scheme CO_2 and noise benefits

Purpose of the presentation:

- An initial estimate has shown that a the cumulative CO_2 benefit of [redacted] between 2023 and 2030 could be saved with the Green Stimulus
- This presentation aims at showing a refined CO_2 saving estimate as well as calculation details
- In addition, a focus is put on noise reduction with a concrete example of the A350 noise advantages vs 777

Summary:

- The Green Stimulus, by incentivising early fleet renewal by new and more efficient aircraft, would result in a cumulative CO_2 savings [redacted] **between 2023 and 2030**, if the scheme is implemented in its entirety.
- The scheme would enable even higher CO_2 savings if it can be used to secure aircraft replacements already planned before the crisis.
- Besides a significant CO_2 reduction, the Green Stimulus, by incentivising the replacement of older generation aircraft by new, quieter aircraft, will greatly contribute to reducing the noise around the airports where these aircraft will fly

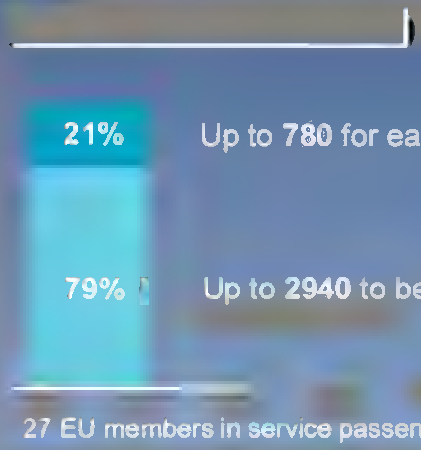
Main modelling assumptions:

- The eligibility criteria considered for this study are the following:
  In order to be eligible for replacement with the scheme, an aircraft needs to a) be operated by an airline registered in one of the 27 EU countries, b) be 15 years old or above in 2023, c) not have a replacement aircraft ordered already
- The total CO_2 yearly savings are computed considering that all eligible aircraft are retired and replaced by a new generation aircraft 2023
- The current fleet and potential replacement fleet have been simplified for the purpose of this modelling

A conservative approach has been adopted at this stage, which does not include aircraft that are currently in the order backlog

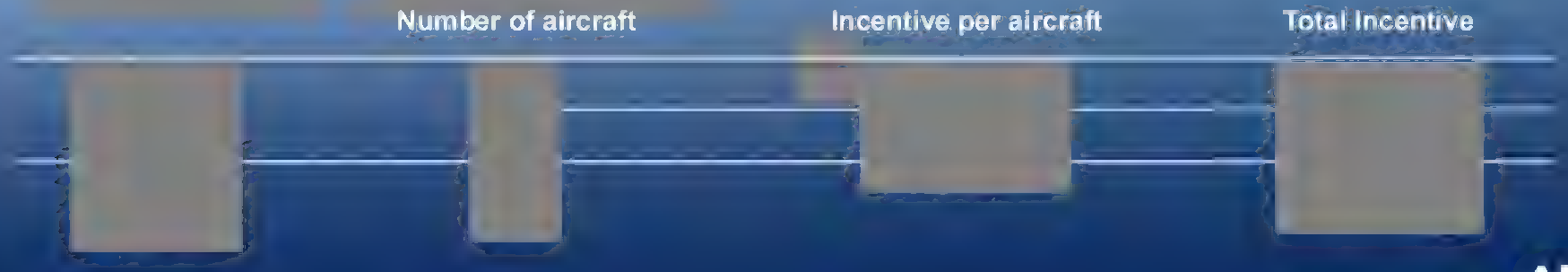
AIRBUS

Fleet renewal scheme proposal: Incentive sizing



Airlines benefit detail

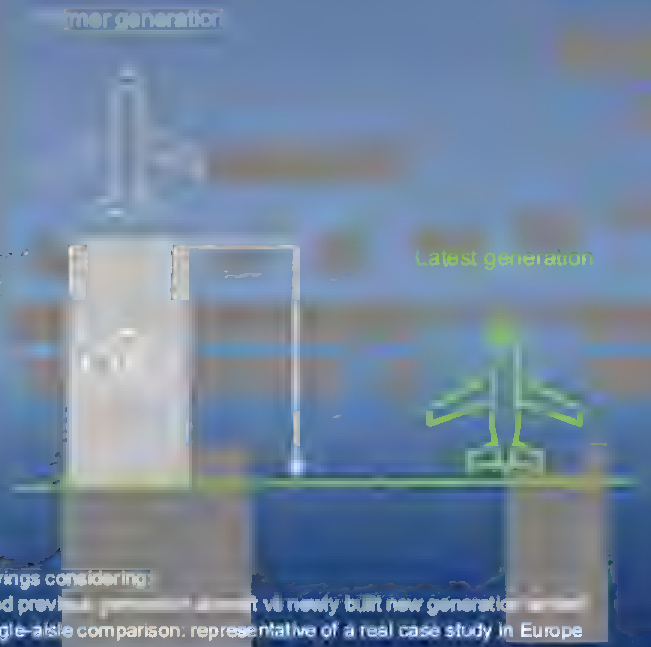
1. Support during return to service critical phase
2. Neutralized capital cost when comparing with a fully amortized aircraft
3. Facilitate future "green financing"
4. Passenger perception on environmental footprint
5. Lower fuel and maintenance cost
6. Enhance fleet reliability



AIRBUS

Fleet renewal scheme CO_2 benefits

New generation aircraft bring up to 20% to 30% fuel burn and CO_2 emissions reduction compared with previous generation aircraft



Aircraft	Fuel burns savings	CO_2 yearly savings
New single-aisle	20%	
New widebody	20% to 30%	

Total CO_2 yearly savings considering the replacement of the identified T&D eligible aircraft

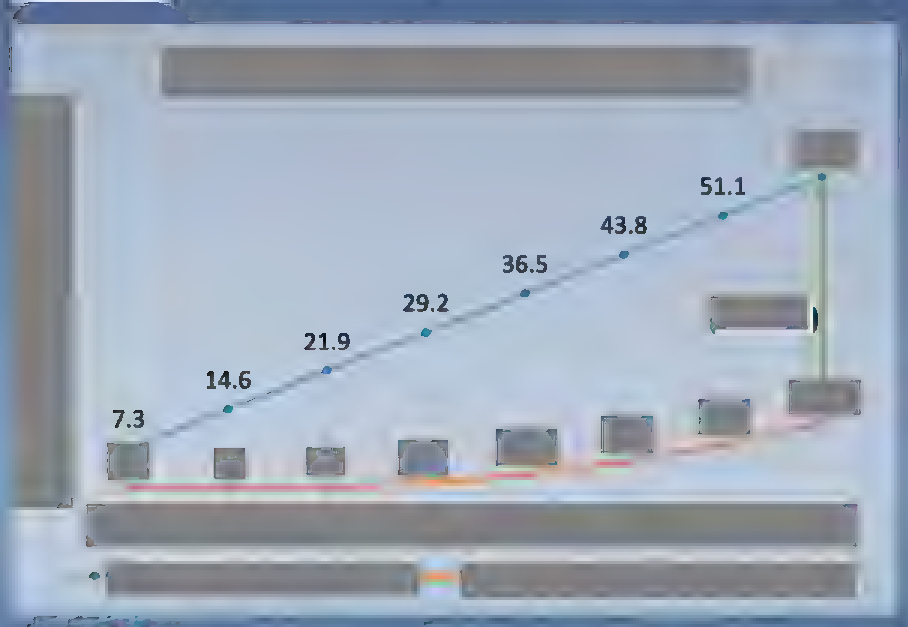
CO_2 savings considering:
- used previous generation aircraft vs newly built new generation aircraft
- Single-aisle comparison: representative of a real case study in Europe
- Widebody: considering typical airline rules and utilisation and flight profile, standard cabin layout, max pax load factor

* Eligible = aircraft operated by an airline registered in one of the 27 EU countries, that would be 15 years old or above by 2023, excluding aircraft for which the replacement has been ordered already
** Total CO_2 yearly savings considering that all eligible aircraft are retired and replaced by a new generation aircraft 2023. Also considering a fleet simplification for modelling purpose.

AIRBUS

Fleet renewal scheme CO_2 benefits

Green Stimulus CO_2 benefits versus natural replacement



The Green Stimulus, by incentivising early fleet renewal, would result in a cumulative CO_2 savings of [redacted] **between 2023 and 2030**, if the scheme is implemented in its entirety.

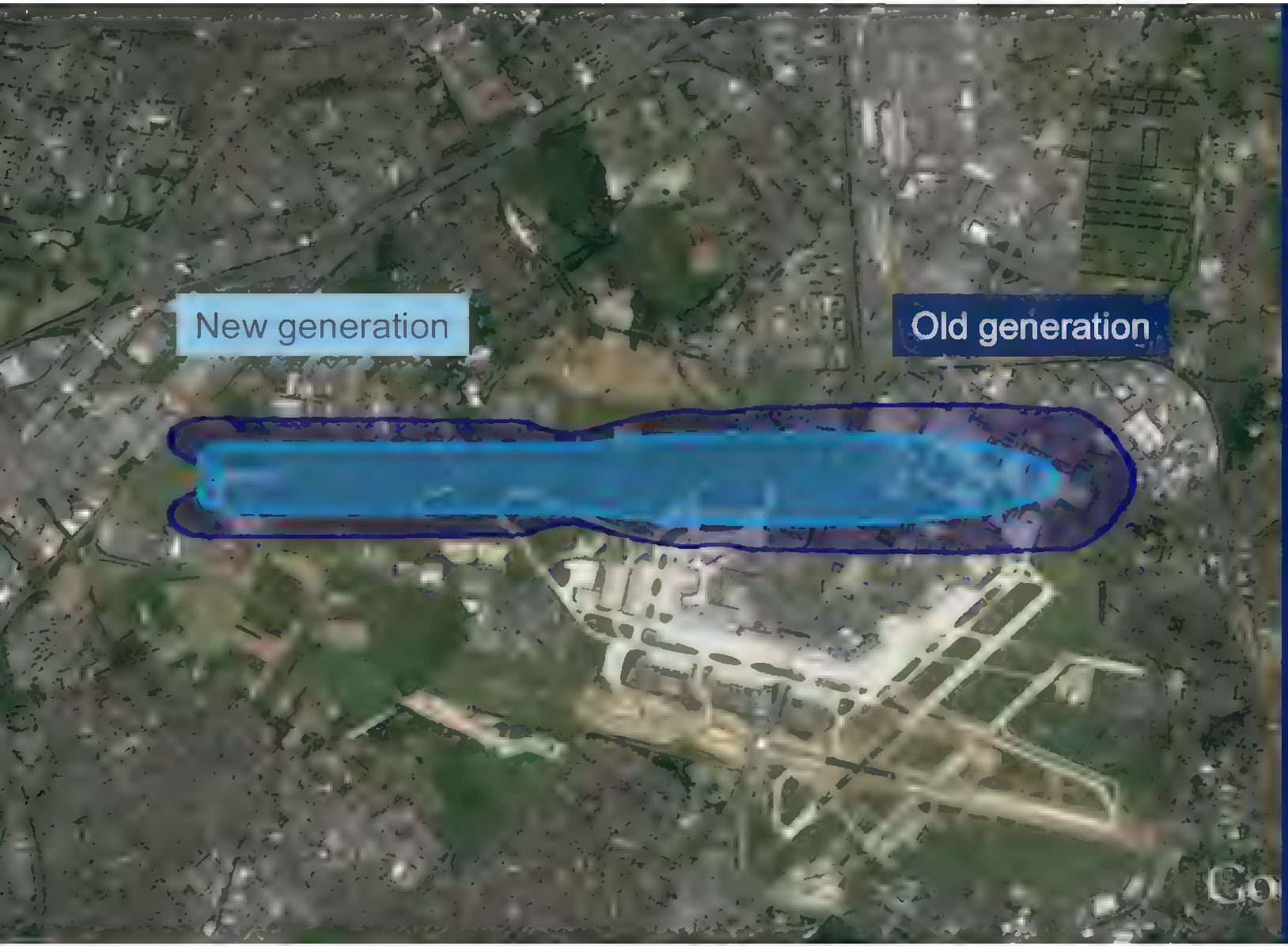
This results in a cost of abatement of ~160€ per ton of CO_2 saved

The scheme would enable even higher CO_2 savings if it can be used to secure aircraft replacements already planned before the crisis.

Assumptions:

- All eligible aircraft are assumed to be replaced by 2023.
- [redacted] yearly CO_2 savings of the scheme corresponding to the savings for the entire eligible fleet, therefore [redacted] from 2023
- [redacted] representing the 'natural' replacement of aircraft without Green Stimulus, we are assuming:
  - that the aircraft we will deliver between 2023 and 2025 are aircraft already in the backlog and that airlines are otherwise delaying their commitments for replacement. Aircraft in the backlog are not eligible to the scheme therefore the corresponding fleet is excluded in the comparison.
  - a slow recovery will mean airlines would delay the typical retirement age to ~27 years old. Therefore the all aircraft <20yo in 2023 will not be replaced before 2030, while aircraft >20yo will be progressively replaced between 2025 and 2030.

AIRBUS



Halving noise footprints

New generation aircraft bring a 50% reduction in noise footprint area around airports

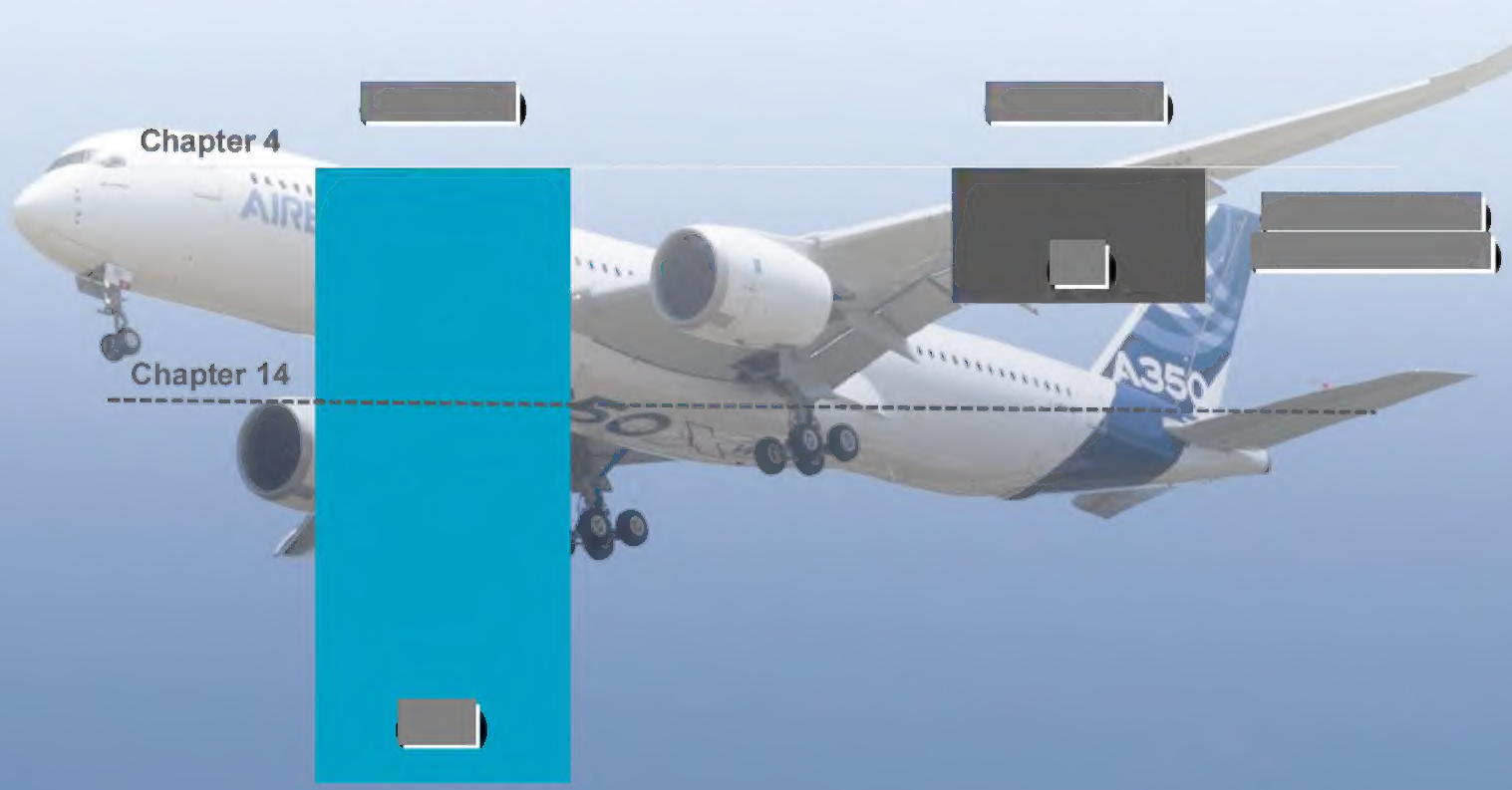
Example of noise footprint comparison previous generation vs new generation aircraft

85dB(A) departure noise footprints, A330neo vs A330ceo

AIRBUS

A350-900 significant advantage versus 777-200ER

Cumulative noise margin vs. ICAO noise standard (EPNdB)



A350 certified noise level

A350 designed to the latest standards with significant margin

Highest certified design weights used

A350-900: MTOW 280t / MLW 207t
777-200ER: MTOW 297.6t / MLW 213.2t

AIRBUS

Fleet renewal scheme Noise benefits

CAA report on noise reduction achieved by replacing older generation aircraft by A350



Summary

This report presents summary information on monitored departure and arrival noise levels for the first three years of operation of the Airbus A350 at Heathrow. Noise measurements for the A350 are compared to equivalent measurements for other aircraft types of similar size whose operations are likely to be replaced by the A350 in the coming years.

At the monitor locations around Heathrow, the analysis has shown that the Airbus A350 is significantly quieter than the Airbus A330, Airbus A340 and Boeing 777. The A350 is on average up to 6 dB quieter on departure than the A330 and 777, and up to 9 dB quieter than the A340. The results also confirm that the A350 is up to 3 dB quieter on arrival than the aircraft types it is intended to replace.

The Green Stimulus, by incentivising the replacement of older generation aircraft by new, quieter aircraft, will greatly contribute to reducing the noise around the airports where these aircraft will fly.

https://publicapps.caa.co.uk/docs/33/CAP%201733%20Final.pdf

AIRBUS

Fleet renewal scheme summary

- The proposed fleet renewal incentive scheme will deliver clear benefits at different levels:

- **Contribution to a greener EU aviation**
  - Cumulative CO_2 savings of [redacted] between 2023 and 2030
  - Noise reduction at airports
  - This could be potentially increased further if backlog orders were considered in the scheme

- **Post C19 crisis support to airlines at the most critical period for the industry**

- **Virtuous support to the EU aviation industry ecosystem and its millions jobs**

© AIRBUS (Airbus S.A.S., Airbus Operations S.A.S., Airbus Operations GmbH, Airbus Operations LDT, Airbus Operations SL, Airbus China LTD, Airbus (Tianjin) Final Assembly Company LTD, Airbus (Tianjin) Delivery Centre LTD). All rights reserved. Confidential and proprietary document. This document and all information contained herein is the sole property of AIRBUS. No intellectual property rights are granted by the delivery of this document or the disclosure of its content. This document shall not be reproduced or disclosed to a third party without the express written consent of AIRBUS S.A.S. This document and its content shall not be used for any purpose other than hat for which it is supplied. The statements made herein do not constitute an offer. They are based on he mentioned assumptions and are expressed in good faith. Where he supporting grounds for these statements are not shown, AIRBUS S.A.S. will be pleased to explain the basis thereof. AIRBUS, its logo, A220, A300, A310, A318, A319, A320, A321, A330, A340, A350, A380, A400M are registered trademarks.

AIRBUS